

STAR STRATEGY FOR TEACHING WORD PROBLEMS IN MATHEMATICS

M. Thilagavathy 1 Dr. F. Deepa 2

- ¹ Ph.D. Research Scholar, Department of Education and Management, Tamil University, Thanjavur-613010, India.
- ² Assistant Professor, Department of Education and Management, Tamil university, Thanjavur-613010, India.

ABSTRACT

Mathematics is an important subject in everyday life. Students feel Mathematics is an abstract and difficult subject, struggle even to get pass marks in the examination. Word problem skills are important to the algebraic cognition and in the aspect of mathematics competence critical for lateral school success. But students used to neglect the topics like fraction, algebra word problems. To remedy this problem STAR strategy is explored in this paper. Students feel difficult to understand word problems due to the lack of language skills, vocabulary skills and to know the content. Hence reasons for these difficulties, skills required to solve the word problems, steps of star strategy and steps to be followed by the teachers are given in brief. Three types of strategy instruction, concrete phase, semi concrete phase and abstract phase integrated with star strategy are illustrated with sample problems. Systematic application of this strategy with proper guidance of teachers helps the students to solve the word problems easily and bring academic success and ensure bright future for the students.

KEY WORDS: Star strategy, Teaching word problems, Mathematics.

INTRODUCTION:

Mathematics is an important subject in everyday life .Students feel Mathematics is an abstract and difficult subject largely due to the strategy followed by the teachers. Many students find difficult to find solution to the problems in Mathematics. Most of the time the class room Mathematics preoccupied with routine teaching and not much time is devoted to learning of Mathematics. So the students struggle even to get pass marks in the examination. Students used to neglect the topics like fraction, algebra word problems. Many students with learning disabilities and emotional disturbances experience difficulty with higher-level mathematics, including algebra and problem-solving skills (Maccini McNaughton, & Ruhl, 1999). It is solely the responsibility of the teachers handling Mathematics to use suitable teaching strategies and techniques which make the teaching effective, successful and interesting.

National Policy on Education (NPE1986)also emphasizes that Mathematics should be visualized as the vehicle to train a child to think, reason, analyze and articulates logically apart from the subject involving analysis and reasoning. In order to remedy this problem of poor mathematics achievement, teachers need to adopt the best teaching strategies. To enhance the understanding level of students and overcome the problem of low achievement in Mathematics STAR strategy is discussed in this study. Word problem skills are important to the algebraic cognition and in the aspect of mathematics competence critical for lateral school success.

WORD PROBLEMS:

Word problems contain figures and letters. Students feel difficult to understand word problems due to the lack of language skills, vocabulary skills and to know the content.

E.g. How to share 12 biscuits to five children equally? How much will each one get?

In the above problem language skill is more important than problem solving skill. Word problems can be divided into two parts. A. information in the word problems B. Method for analysis

Skills required for solving word problems:

- Language skills, vocabulary skills and skill of analyzing the content.
- Knowing the technical word specific to the content.
- · Knowledge to understand the content
- · Self-monitoring, self-regulation and basic mathematics skills
- Problem-solving and reasoning skills.
- Arithmetic and computational skills

Difficulties in learning word problems:

- Students unable to differentiate the message given in the word problems.
- Lack of motivation, self-confident, or negative attitude to learn due to bitter

- experiences faced by the academic failures.
- Students with poor reasoning and problem solving skills feel difficult to solve problems in the higher level mathematics.
- Lack of interest makes the students to become passive listeners, not having
 proper attention in the class, not taking any risk or any technique to solve the
 problems.
- · Lack of self-learning, and self-regulation during problem-solving.
- Face problems in solving word problems due to poor arithmetic and problem solving skill.

STAR SRATEGY:

"Strategies are groupings of actions, mental or physical, designed to solve a problem" (Biddlecomb & Carr, 2010, p. 2). To solve mathematics word problems different strategies are used. One strategy for visual learners is the use of manipulative which are helpful to students in visualizing what they are reading in the word problem. Other strategies that are used for problem solving are drawing pictures, making charts, working backwards, and guess and check (Rickard, 2005). But different Mathematics topics can be solved using star strategy. So, in this study the first letter mnemonic STAR strategy is concentrated because it equips students to complete general problem-solving steps and related sub steps. STAR lessons involve step-by-step behavioral instruction and visual prompts. It is often used for students with Autism, but it also effective with older students with mild disabilities.

☆"STAR" Means:

S – Search the word problem

T - Translate the word problem

A - Answer the problem

R - Review the solution

STEPS IN STAR STRATEGY:

- · Collect information to use the strategy
- Provide model reading by the teacher.
- Practice by the teacher's guidance.
- Provide Individual Practice.
- · Review and correction.
- Knowing the general rules.

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Step-1. Collect information to use the strategy

- Relating the known information to unknown concept.
- Provide the reason for learning new topic
- Link the new concept to the basic skills.
- Combine the information related to social environment
- Explain the steps with examples.
- Give some activities of star strategy.

Step-2. Provide modeling by the teacher

- Teacher reads the mathematical problem.
- Students answer questions and write down their responses
- Teacher prompts while students applying the strategy.

Step-3: Practice by teacher's guidance

- Provide opportunities for students to practice the new strategy
- Assist students until they can perform the task individually.

Step- 4: Provide individual Practice

- Provide problems for individual practice
- Watch the students' activities.
- Assess the students' skills in applying the strategy.
- Practice the students to solve the problems related to the environment.

Step-5: Review and correction

- Confirmation of students' activities with mathematics book.
- Correct the mistakes.
- Remedial teaching to reduce the mistakes
- Practice students with similar problems and monitor their performance.
- Develop confidence among the students through guidance.
- Practice the students till to get positive feedback.

Step- 6: Knowing the general rules

- Provide chances for the students doing different types of problems.
- Questions to know the general rules.
- Explain other Problem-solving situations.
- Activities for Real-world situations.

Step-7: Follow up work

List out the steps of star strategy or problems related to star strategy.

STEPS TO BE FOLLOWED BY THE TEACHER IN STAR STRATEGY:

Individual attention to be paid by the teachers: Students in the class room have different behavior. For example some students read loudly, some other reads slowly. So teachers give equal importance to all.

Special attention to slow learners and for students with lack of interest.

Provide peer learning and group learning to change the slow learners in to average students.

- Motivate the students individually to apply STAR strategy: Guide the students to read the problems carefully and translate in to mathematical activities to solve the problem.
- Conceptualization: Different type of examples like to sum a positive and negative numbers, difference in age, degrees, height and time etc. should be practiced by the students to understand the concept. Van De Walle (2001) stated, "If we emphasize only the procedural rules, there is little reason for students to attend to the conceptual justifications. Do not be content with right answers; always demand explanations".

For example:

There are 80 students present in a class room. Girls are ten more than the

boys. Calculate number of boys and girls in the class

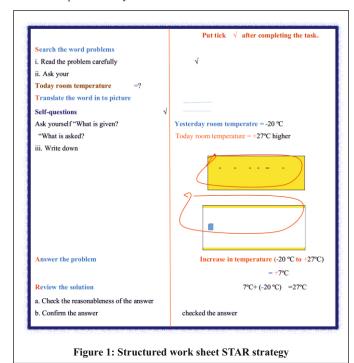
STRATEGY INSTRUCTION IN STAR STRATEGY:

There are three types of strategy instruction integrated with STAR strategy. It support the students understanding mathematical concept easily.

CONCRETE PHASE:

Students represent the problem with concrete objects or visuals

Sample Problem: In Nilgri Yesterday the room temperature was -20 °C. Today the temperature is $\pm 27^{\circ}\text{C}$ higher than the yesterday room temperature. Find out the room temperature today.



SEMI CONCRETE PHASE:

In this phase students translate the problem in to drawing or use pictorial representations of the quantities.

Sample Problem: The length and the breadth of a room is 6m and 4m respectively. The cost of flooring for 1sq.m is Rs.22. what will be the cost of flooring for the entire room?

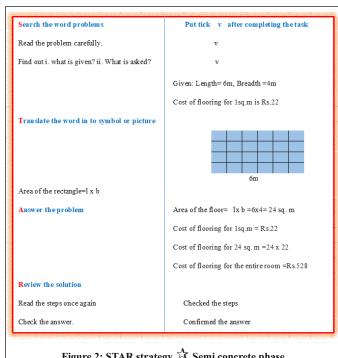


Figure 2: STAR strategy ☆ Semi concrete phase

Abstract Phase: Students use numbers, symbols and equation to represent the

problem instead of pictures. C-S-A is often integrated with meta-cognitive instruction (i.e. mnemonics)

ABSTRACT PHASE:

Students represent the problem with numerical symbol and equation

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Mohan spent Rs.75, 000 to buy a scooter and a washing machine. Amount spent to buy washing machine is
Rs.54, 000 lesser than the cost of scooter. Find out the amount spent to buy scooter and washing machine
a. Students read the problem carefully
b. Regulate their thinking through self-questions I. "What is given? ii. "What is asked?
Total amount spent to buy scooter and washing machine = Rs.75, 000
Amount spend to buy Washing machine is Rs.54, 000 lesser than the amount spent to buy scooter
To find:
Amount spent to buy scooter and washing machine
Translate the word problem in to symbols and equations
Keep the amount spent to buy a scooter as a
Amount spent to buy a washing machine as y
Total amount spent to buy scooter(x) and washing machine(y) = Rs.75, 000
So, x + y = 75,000... (1)
Amount spend to buy scooter is Rs.54, 000 greater than the amount spent to buy washing machine.
So, x =y+54,000.....
Answer the problem
Put the equation (1) in (2)
x + y = 75,000
x-y=54,000 = 2x=54000+75000= 12,9000 \text{ so } x=64500
Amount spent to buy scooter = Rs.64, 500
Apply the value of x in the equation (1) y= 75,000- 64,500= 10,500
 Amount spent to buy washing machine = Rs.10, 500
Review the solution
a. Put the value of x and y in the equation (1)
So, x + y = 75,000
64500 +10.500= 75.000 so it is proved that the values are correct
b. Check the reasonableness of the answer
c. Confirm the answer
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Figure 3: STAR Strategy Abstract Phase

CONCLUSION:

Most of the students feel learning word problems is a burden and causes academic stress which create negative attitude among students towards Mathematics. STAR strategy is the best remedial measure for students with learning difficulties. This strategy consists of effective teaching component to enhance the understanding level of students and create interest in Mathematics. Systematic application of this strategy with proper guidance bring academic success and ensure bright future for the students.

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